

14TH U.S./NORTH AMERICAN MINE VENTILATION SYMPOSIUM
University of Utah, Salt Lake City, UT - June 17 - 20, 2012

Editors:
Felipe Calizaya and Michael G. Nelson
Mining Engineering Department
The University of Utah

U THE UNIVERSITY OF UTAH®

2012

AB86-COMM-15-12

Table of Contents	
Sponsors and Committees	v
Foreword	XIII
<i>Ventilation Planning</i>	
A Case for Revision of Time-Honoured Mine Ventilation Design Parameters through Active Field Observations <i>Bharath Belle</i>	3
Barometric Resistance Surveys: “The times, they are a changing”. <i>John Ashton Rowland</i>	13
Comparison of Barometer Pressure Surveys with Other Measurement Techniques <i>Rebecca Anne Ruckman, John Robert Reid Bowling</i>	23
Harmonization and Standardization of Risk Management of Underground Ventilation in Australia <i>Michael A Tuck, Manikam Pillay</i>	31
Ventilation Design for the Boleo Project <i>Susan B. Patton, Gary L. Skaggs, Scott G. Britton</i>	39
Ventilation system design for the CODELCO New Level Project <i>Keith G. Wallace, Brian Prosser, Jose R. Donoso, Armando F. Guerrero</i>	47
<i>Numerical Modeling</i>	
A technique for creating perfluorocarbon tracer (PFT) calibration curves for tracer gas studies <i>Edmund Chime Jong, Susanne Whitney Underwood, Guang Xu, Kray Davis Luxbacher, Harold M McNair</i>	57
Application of graph theory algorithms to detect multiple recirculation paths <i>Enrique Ignacio Acuña, Peter Grossman, Hyam Rubinstein</i>	65
Choosing command and control for ventilation systems within the mine environment. <i>Sancar James Fredsti, Pierre Mousset-Jones</i>	71
Convective, diffusive and dispersive transport of gaseous constituencies by ventilation <i>George Danko</i>	75
Effect of Booster Fan in Ventilation Networks – Computational and Experimental Approaches <i>Arash Habibi, Stewart Gillies</i>	83
Evaluation of mine size on turbulent effective diffusion from tracer gas measurement data and numerical simulation <i>Arif Widiatmojo, Kyuro Sasaki, Yuichi Sugai</i>	91

Improved Design of Total Air Conditioning System in Underground Coal Mines – A Computational Fluid Dynamic Study <i>Jundika Candra Kurnia, Agus Sasmito</i>	97
Integration of climate projections in ventilation network calculations <i>Rainer Beez, John-Glen Swanson, Oliver Langefeld</i>	103
Model and experimental studies in the longwall goaf in the methane inflow conditions <i>Waclaw Dziurzynski, Stanislaw Wasilewski</i>	111
 <i>Coal Mine Ventilation</i>	
A Modeling Study on Longwall Tailgate Ventilation <i>Jurgen F. Brune, Michael Sapko</i>	121
An alternative solution to the problem of efficiently ventilating room and pillar headings. <i>Bob Leeming, William Tonks</i>	127
Computational Fluid Dynamic Modeling of Sealed Longwall Gob in Underground Coal Mine <i>Dan Worrall, Elizabeth Wachel, Ugur Ozbay, David Munoz, John Grubb</i>	135
Ventilation on demand for a high productivity longwall mine project <i>Ruben Ponce Aguirre</i>	143
 <i>Metal/Non-metal Mine Ventilation</i>	
CFD Modeling of Pollution Transport in Open Pit Mines under Arctic Air Inversion <i>Will Collingwood, Kumar Raj, Sukumar Bandopadhyay</i>	151
Fifteen Years of Resistance Data Collected at Freeport Indonesia <i>Ian John Duckworth, Ian Loomis, Brian Prosser</i>	161
Planning and Selection of the Main Fans for the Grasberg Block Cave Mine <i>Ian M. Loomis, Ian J. Duckworth, Ketut Karmawan</i>	167
Series ventilation circuits in hardrock mines-can they be designed and operated safely? <i>Derrick John (Rick) Brake</i>	175
Updating Leeville mine ventilation system to support future growth <i>Sandeep Arya</i>	183
 <i>Diesel Emissions Control</i>	
Airflow Specification for Metal/non-metal mines <i>John R. Marks</i>	191
Diesel particulate Matter (DPM) control strategies at Leeville mine <i>Troy Terrillion, Sandeep Arya</i>	197

Isolated zone evaluation of the Tier 4i diesel engine equipped with an SCR system <i>Aleksandar D Bugarski, Emanuele G Cauda, Samuel J Janisko, Larry D Patts, Jon A Hummer, Troy Terrillion, Jerald Keifer</i>	205
Live transmission of real-time engine, exhaust quality and ambient data from mobile diesels equipment <i>Brent Rubeli, Stephen Hardcastle, Dasys Andrew, Glenn Lyle, Kirk Petroski</i>	213
Pilot Study--Protection factor of closed cab equipment for Diesel Particulate Matter in an underground mine: <i>John R. Kimball, Joan Faye Griffith</i>	221
Simulation of Hydrogen Release Behaviour From an Underground Distribution System for Hydrogen Vehicle Power Application <i>Benjamin Angers, Andrei Tchouvelev, Marc Bétournay, Stephen Hardcastle, Pierre Bernard</i>	225
Tailpipe emissions and ambient concentrations of gaseous pollutants from diesel engines during in-use and isolated zone studies. <i>Emanuele G Cauda, Larry Patts, Aleksandar Bugarski, Samuel Janisko, Jon Hummer, Troy Terrillion, Jerald Kieffer, Louie Moret, Chris Darby</i>	233
Toward Mine Aerosol and Ventilation Mapping through Computer Vision-Assisted Sensing <i>Sam Janisko, Larry Patts, Aleksander Bugarski, Emanuele Cauda</i>	241
Ventilation Requirements for Modern Diesel Engines <i>Robert A. Haney</i>	249
 <i>Mine Gases and Dusts</i>	
A 2012 update on the world VAM oxidizer technology market <i>Clint Burlin</i>	259
A CFD analysis of air flow patterns in the face area for continuous miner making a straight initial cut <i>Vijay Kollipara, Yoginder Chugh</i>	265
A CFD Modeling Study of Spatial Spray Locations for Continuous Miner for Efficient Dust Control <i>Vijay Kollipara, Yoginder Chugh</i>	273
A Field Assessment of SIUC Innovative Spray System for Continuous Miners for Dust Control <i>Yoginder Chugh, Harrold Gurley</i>	281
An Experimental Study of Approaches to Minimize Pressure Loss within Wet Scrubber and its Effect on Coal and Quartz Dust Control <i>H. Gurley, Vijay Kollipara</i>	289
Dissipating the Heat Inside Mine Refuge Chambers <i>Jurgen F. Brune</i>	297
Technical measures for dust control in the German coal mining for the prevention of "Black Lung" and silicosis diseases <i>Kurt Bartke</i>	305

Utilizing NetzCAD as a tool for predicting gas emissions and outbursts <i>Elisabeth Clausen, Oliver Langefeld, Amit Agasty</i>	309
 <i>Heat and Humidity</i>	
An overview of Canadian heat stress research related to mining <i>Stephen G Hardcastle, Glen P. Kenny, Cheryl Allen</i>	317
CFD modeling of direct heat exchange with water spray systems <i>Amit Agasty, John-Glen Swanson, Oliver Langefeld</i>	329
Development-end Cooling Study <i>Davood Bahrani, George Danko</i>	337
Factors That Influence on The Mine Climate Simulation <i>Wenyu Yang, Masahiro Inoue</i>	343
Modeling of the Natural Heat Exchange Area at Creighton Mine for Operational Decision Support <i>Lorrie Fava, Bob Anderson, Scott McGarvey, Dean Millar, Doug O'Connor, Cheryl Allen</i>	351
Modular Thermal Transfer Unit (MTTU) - Portable Surface Ice Stope <i>Cheryl Allen, Eric Rantanen, John Morgan</i>	359
Temperature variations in underground tunnels <i>George Danko</i>	365
 <i>Mine Fires</i>	
A preliminary full scale cutting test to find pre-cursor parameters of frictional ignition <i>Eunhye Kim</i>	377
Experimental Investigation of the Effect of Ventilation on Underground Mine Fire Behavior under Different Conditions <i>Xichen Zhang, Yutao Zhang, Jerry C. Tien</i>	385
MFIRE 3.0 - NIOSH Brings MFIRE Into 21st Century <i>Alex C. Smith, Audrey F. Glowacki, Liming Yuan, Lihong Zhou, Gregory P. Cole</i>	391
Simulation of Inertization for Underground Mine Fires <i>Yutao Zhang, Xichen Zhang, Jerry C. Tien</i>	397
 <i>Spontaneous Combustion</i>	
A Mathematical Model of R70 Self-Heating Test for the Propensity of Coal Spontaneous Combustion <i>Yi Luo, Xinyang Wang</i>	407
Applications of Directionally Drilled Horizontal Gob Boreholes for Methane Drainage in Western Coal Mines <i>Daniel Brunner, Forrest P. Schumacher</i>	415

Benchmarking Coal Selfheating <i>Basil Beamish</i>	423
Control of Spontaneous Combustion in a Pillar using a Flexible Membrane <i>Duncan Chalmers, Alex Lim, Elliot Baume, Peter Holt</i>	429
Quantifying spontaneous combustion inhibition of reactive coals <i>B Basil Beamish, Rowan T Beamish</i>	435
 <i>Main and Booster Fans</i>	
A Study of Recirculation in a Coal Mine Ventilation Model <i>Jessica M Wempen, Felipe Calizaya</i>	443
Booster fan applications for sections in longwall and room and pillar mining <i>Christopher Pritchard, Anu Martikainen, Andrew Wala, Garrett Frey, Gerrit Goodman</i>	449
Comparison of use of booster fans in US Coal Mines to alternative approaches for maintaining ventilation <i>Stewart Gillies</i>	459
Underground booster fans - current UK practice for safe installation and management. <i>John Robert (Bob) Leeming, Duncan Webb</i>	467
Use of Underground Booster Fans in Foreign Prominent Coal Mining Countries Compared with the Situation of Prohibition in the United States <i>Stewart Gillies, Felipe Calizaya</i>	475
 <i>Ventilation Monitoring and Control</i>	
A Comparative Study on Ventilation Efficiency in Dead Spaces Along Airways Based On Laboratory Model, And Mine Measurement. <i>Gabriel ARPA, Kyuro SASAKI, Arif WIDIATMOJO, N.Priagung WIDODO, Yuichi SUGAI</i>	483
A review of computer based intelligent control and monitoring systems for mining ventilation <i>Michael M. Devlin, Kenneth R. Griffin, Kray Davis Luxbacher, Michael E. Karmis</i>	491
Assessing environmental changes and recognizing activity within a VOD system <i>Stephen G. Hardcastle, Charles Kocsis, Glenn Lyle, Keith Bullock, Andrew Dasys, Cheryl Allen, Erik Bartsch</i>	499
Comprehensive ventilation simulation of atmospheric monitoring sensors in underground coal mines <i>Kenneth R. Griffin, Kray D. Luxbacher, Steven J. Schafrik, Michael E. Karmis</i>	509
Developing Ventilation Management System at Leeville Mine <i>Sandeep Arya, Chris Raymond, Clem Hartery, Dirk Danninger</i>	517
Gas Sensor Limitations for the Qualitative Control of Ventilation on Demand Systems <i>Stephn G Hardcastle, Kevin C. Butler</i>	525

SmartEXEC Optimized Mine Ventilation on Demand (VOD) at Xstrata's Nickel Rim South <i>Hugo Dello Sbarba, Erik Bartsch, Josh Lilley</i>	535
Use of Ultrasonic Airflow Monitoring Techniques for Tunnel Ventilation Systems <i>Richard Edwin, Jr. Ray, Doug Maenpaa, Jamie Valade</i>	543
 <i>Ventilación en Español</i>	
Caracterización numérica y experimental de pérdidas de carga en el nivel de producción en método Block Caving <i>Juan Pablo Hurtado Cruz, Nicolás Diaz Pavez, Carlos Maya, Enrique Acuña Duhart</i>	553
El beneficio de algoritmos genéticos sobre la optimización manual de redes de ventilación principal <i>Enrique Acuña, Roberto Alvarez, Juan Pablo Hurtado</i>	561
Estandarización del proceso de ventilación en minas de carbón- Caso Carbones del Caribe S.A.S. Colombia <i>Carolina Toro</i>	569
Evaluación del sistema de ventilación de Mina Colquechaquita <i>Juan Luis Condori, Luis Hidalgo</i>	577
Guía para Estimar el Requerimiento de Aire en Minas que Utilizan Métodos de Open Stopping <i>Eduardo Cordova, Felipe Calizaya</i>	583
Optimización del sistema de ventilación en una mina de gran altura, Compañía Minera Raura <i>Nestor Rueda, Carolina Toro</i>	591
Planeamiento de ventilación asistida para la U.P. San Cristobal, Cia Minera Volcan <i>Jose Corimanya, Ruben Mendez</i>	599
Rutas de escape en casos de emergencia <i>Elena Perez</i>	609
Utilización de ventiladores secundarios en Minas subterráneas <i>Felipe Calizaya</i>	617
Ventilación en Altura: Criterios de diseño de un sistema de ventilación principal <i>Jordi Puig Mengual</i>	625
Author Index	631